Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

In the Matter of	)	
	)	
Revision of the Commission's Rules	)	CC Docket No. 94-102
To Ensure Compatibility With Enhanced	)	
Emergency Calling Systems	)	

To: Wireless Telecommunications Bureau

PETITION FOR WAIVER

Bell Atlantic Mobile, Inc. ("BAM"), pursuant to the November 13, 1998 Order of the Wireless Telecommunications Bureau in the above-referenced proceeding and 47 C.F.R. § 1.3, hereby petitions for a waiver of 47 C.F.R. § 20.18(c).

Section 20.18(c) requires cellular and certain other mobile service providers such as BAM to "be capable of transmitting 911 calls from individuals with speech or hearing disabilities through means other than mobile radio handsets, e.g., through the use of Text Telephone Devices." BAM is firmly committed to providing 911 TTY access to all of its subscribers. BAM currently provides TTY access to all analog subscribers. Despite its efforts, however, the network hardware, software and wireless phones that are necessary for the transmission of 911 calls on its digital network through TTY devices is not yet available. Compliance with the current December 31, 1998 deadline set forth in Section 20.18(c) is not technically

feasible. Accordingly, the Bureau should waive that deadline to permit BAM to acquire and implement a solution for digital TTY calls.

I. PROCEDURAL BACKGROUND

In December 1997, in response to record evidence that the Commission's wireless 911 requirements were not technically feasible for 911 calls made on digital systems, the Commission deferred enforcement of Section 20.18(c) until October 1, 1998, and authorized the Bureau to extend the deadline to December 31, 1998.[1] The Commission noted the lack of established standards for interfaces between TTY and digital systems as well as numerous other technical obstacles impairing TTY-digital compatibility. On September 30, 1998, the Bureau granted an extension of the deadline to November 15, 1998, and on November 13, 1998, it further extended the deadline until December 31, 1998, based on the reports of the TTY Forum and other record data showing that digital TTY service remained infeasible.[2] But the Bureau required that if wireless carriers could not meet the new deadline, they must submit individual petitions for waiver of that deadline. This petition for waiver is submitted pursuant to the procedure set forth in the November 13 Order.

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1 Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, Memorandum Opinion and Order, 12 FCC Rcd 22665 (1997), at ¶¶ 53-59.

2 Revision of the Commission's Rule to Ensure Compatibility with Enhanced 911 Emergency Calling Systems, Order, DA 98-1982 (released September 30, 1998); Order, DA 98-2323 (released November 13, 1998).

II. BAM'S COMPLIANCE EFFORTS AND WORK PLAN

BAM fully supports the goals of this proceeding, particularly the public safety benefits of enabling individuals who are deaf, hard-of hearing, or who have speech disabilities to transmit calls using TTY devices over BAM's cellular network. BAM has successfully acquired and implemented the necessary technology to transmit TTY calls through its analog system, and currently provides that capability in all of the cellular markets it serves. BAM is no less committed to acquiring the capability to transmit TTY calls made from digital TTY equipment in areas where BAM has deployed CDMA digital technology to supplement its analog cellular service. However, as the Commission has consistently recognized in this proceeding, there have been, and remain, intractable problems in meshing older TTY equipment and technology with the new digital technologies. While substantial progress has been made, it is not feasible for BAM to comply because the necessary equipment is not available.

Attached to this Petition is an affidavit of Mr. Ted L. Hoffman, BAM's Vice President of Technology Development, which supplies a detailed report on BAM's past efforts and current plans to achieve digital-TTY compliance. The attached report documents BAM's work to develop, acquire and implement the technology necessary to transmit TTY calls on its digital system. It supplies the information the Bureau's November 13 Order requested in order to extend the current deadline, and commits to supply quarterly progress reports, as the Order also provided. BAM thus respectfully requests it be granted a waiver.

As is clearly evident from the report, BAM is committed to complying with the TTY/911 rule in as expedited fashion as technically possible. BAM has worked diligently to develop and procure the technology that will enable it to transmit digital TTY 911 calls. BAM has, for example, requested solutions from all of its wireless phone and network infrastructure vendors, met with vendors individually and in joint sessions, explored numerous voice-based and data-based short-term and long-term solutions, requested that vendors conduct tests, conducted its own tests, and actively participated in the TTY Forum and CDMA Development Group.

BAM has decided to adopt and implement the Interworking Function (IWF) data-based solution. It based this decision on substantial testing and technical evaluation, as described in the attached report. BAM believes that this solution will offer the best-quality TTY service to subscribers who need that service.

The report lays out BAM's plan to implement the IWF data-based digital TTY solution as part of its deployment of a CDMA data network. The data network is being tested and, beginning in early 1999, will begin to be deployed system-wide.

The fact remains, however, that the current deadline is infeasible. As the report notes, there are not one but multiple barriers to compliance: "There are no TTY products available today that will connect to a digital wireless phone, there are no digital phones capable of connecting to a TTY and transmitting the Baudot signals, and finally there is no network that will accept TTY signals and transmit them to the end user." BAM cannot solve the first problem because it does not manufacture or sell TTY equipment. As for the second, BAM has requested that

each of its digital wireless phone vendors develop and supply it with phones that are compatible with TTY devices. No vendor, however, has made that commitment, let alone set a target date for supplying phones. As for the third problem, BAM's implementation of the IWF solution as part of its deployment of a CDMA digital data network will provide it with the capability to transmit TTY-originated 911 calls. IWF implementation is, however, conditioned on the production and delivery of the particular IWF platform by BAM's current vendor of that equipment, 3Com. BAM has and will continue to insist that all of its suppliers work with it to achieve compliance as early as possible.

III. COMMISSION PRECEDENT SUPPORTS GRANT OF A WAIVER.

In addition to BAM's adherence to the procedures for waiver set forth in the Bureau's November 13, 1998 Order discussed in the attached report and supporting documents, a waiver here is further justified because BAM's request satisfies the general waiver standard under 47 C.F.R. § 1.3. The Commission may under Section 1.3 waive any provision of its rules if good cause is shown.[3] The Commission has, under similar circumstances, consistently held that waiver of a rule is warranted where compliance is not technically feasible.[4]

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[3] See Northeast Cellular Telephone Co. v. FCC, 897 F.2d 1164, 1166 (D.C. Cir. 1990); WAIT Radio v. FCC, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

[4] See Pierce Telephone Company, Inc., 13 FCC Rcd 7241 (1998) (granting waiver of Carrier Implementation Code implementation schedule based on technical infeasibility); Hardy Telecommunications, Inc., 13 FCC Rcd 6568 (continued...)

For example, the Commission recently granted waivers of compliance deadlines to numerous local exchange carriers, based on its finding that meeting the four-digit Carrier Identification Code ("CIC") implementation schedule was not technically feasible.[5] Before granting the requests, the Commission considered carriers' efforts to comply with the schedule and the unavailability of the equipment and products that were necessary for compliance. Here, too, BAM has made and continues to make efforts to achieve compliance. Here, too, compliance remains technically impossible at this time.

Similarly, the Commission issued multiple waivers of the compliance deadline for rules regarding the calling number identification service ("Caller ID"), based on the representations of carriers that the necessary software had not yet been deployed, and also temporarily stayed enforcement of the compliance deadline where there was evidence that the necessary software had not been developed.[6] The same lack of equipment availability justifies grant of a waiver here. As demonstrated in the attached information, BAM has sought to acquire the

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(...continued)

(1998) (same); Implementation of the Pay Telephone Reclassification and Compensation Provisions of the Telecommunications Act of 1996, 13 FCC Rcd 4998 (1998) (waiving payphone-specific coding digit requirement for per-call compensation based, inter alia, on technical complexities); Rules and Policies Regarding Calling Number Identification Service—Caller ID, 11 FCC Rcd 1743 (1995) (waiving in part and staying in part Caller ID requirements based on technical infeasibility).

5 See, e.g., Pierce Telephone Company, Inc., 13 FCC Rcd at 7243; Hardy Telecommunications, Inc., 13 FCC Rcd at 6571.

6 Rules and Policies Regarding Caller ID, 11 FCC Rcd at 1749-53.

necessary equipment. But, as the Commission itself has conceded on numerous occasions, most recently only three weeks ago in the November 13 Order, the technology that will enable digital TTY transmissions is simply not yet available.

Moreover, the burden on BAM to comply by December 31, 1998 far outweighs any potential burden on its cellular subscribers. BAM currently offers TTY service throughout its analog system. Any hearing-impaired or speech-impaired subscriber can make a 911 call on BAM's network using an analog phone equipped with TTY capability, and, as noted in Attachment 1 to this report, numerous such phones are readily available. Subscriber impact is further minimized by the fact that the Bureau has determined that it will condition waivers on carriers' submission of reports from wireless carriers every three months documenting further progress toward compliance.

Forcing compliance before it is feasible will also have an adverse impact on consumers because the product they would be likely to receive would not be fully functional. Tests conducted by the TTY Forum indicate that there is a high character error rate for some tested equipment, and BAM's own technical studies confirm an unacceptably high error rate. In the context of emergency calls, such an error rate is clearly intolerable. The Commission would be remiss in obligating BAM to rush to deploy inadequate equipment, particularly when BAM already transmits all 911 calls that are made from TTY-compatible handsets.

Additionally, Section 255 of the Communications Act and general principles of administrative law preclude enforcement of the December 31, 1998 compliance

date. Section 255 provides that telecommunications equipment must be "accessible to and usable by individuals with disabilities, *if readily achievable.*"[7] Section 255(a)(2) states that "readily achievable" has the meaning provided in Section 301(9) of the Americans with Disabilities Act of 1990. That section defines readily achievable as "easily accomplishable and able to be carried out without much difficulty or expense."[8] Because, as discussed above and in the attached report, the technology necessary to permit TTY calls over BAM's CDMA digital system does not presently exist, compliance with the December 31, 1998 deadline is not "readily achievable," and enforcing that date despite these facts would conflict with Section 255. In addition, federal agencies cannot lawfully force regulated entities to conform to rules where compliance is physically impossible. Denying a waiver here, thereby placing BAM in non-compliance with a requirement that it cannot meet, would be clearly arbitrary and capricious and a violation of the Administrative Procedure Act.[9]

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7 47 U.S.C. § 255 (emphasis added).

8 42 U.S.C. § 12181(9).

9 See 5 U.S.C. §§ 551 et seq.

CONCLUSION

Accordingly, BAM requests that the Bureau grant its request for a waiver. Following grant of the waiver, as the November 13 Order provides, BAM will submit every three months, beginning on the date of the grant, a report indicating the progress it is making toward implementation of TTY/digital capability.

Respectfully submitted,

BELL ATLANTIC MOBILE, INC.

By: 

John T. Scott, III
Crowell & Moring LLP
1001 Pennsylvania Ave., N.W.
Washington, D.C. 20004
(202) 624-2500

Its Attorneys

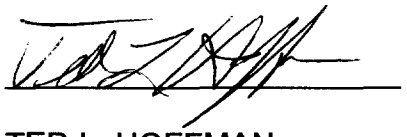
Dated: December 4, 1998

AFFIDAVIT OF TED L. HOFFMAN

I make this affidavit in support of Bell Atlantic Mobile's petition for waiver of the Federal Communication Commission's rules governing TTY access to 9-1-1 over digital wireless systems, 47 C.F.R., §20.18 (c). I am the Vice President of Technology Development of Cellco Partnership which does business as Bell Atlantic Mobile. I have held this position since June 1993. I have personal knowledge of the facts stated herein.

I have reviewed the material and hereby declare under penalty of perjury that the forgone is true and correct to the best of my knowledge and belief.

December 3, 1998



TED L. HOFFMAN

BELL ATLANTIC MOBILE
DIGITAL TTY COMPLIANCE EFFORTS AND PLAN

Bell Atlantic Mobile (BAM) is dedicated to resolving the issues concerning TTY compatibility with digital wireless technologies, particularly the CDMA digital technology which BAM is deploying in its cellular network. BAM is committed to providing any hearing-impaired or speech-impaired subscriber with full access to its network. To date, BAM has made extensive efforts to inform its customers of the availability of TTY-compatible analog phones, and to ensure that such phones are available. It has adopted an outreach plan, a notification strategy, and other programs to ensure customers are fully informed. See Attachment 1. BAM is unaware of any subscriber who has been unable to use TTY-compatible equipment on BAM's analog system. It strongly believes that it has fully complied with Section 255 of the Act.

BAM recognizes, however, that the FCC has required carriers to make digital TTY-compatible equipment available as well. There are not one but three distinct problems that need to be solved before digital networks can support access by the hearing impaired: There are no TTY devices available today that will connect to a digital wireless phone, there are no digital phones capable of connecting to TTY devices and transmitting Baudot signals, and digital networks cannot presently accept TTY signals and transmit them. None of these problems can be solved independently of the other.

BAM has been actively participating in the TTY Forum to develop digital solutions. That participation has included the commitment of human and financial resources to working with handset and infrastructure vendors and the TTY Forum, conducting independent studies and requesting that vendors do the same, purchasing test equipment, and other ongoing work. At this time, BAM is working on a day-to-day basis with Lucent Technologies and 3Com, its principal network

equipment suppliers, to develop a data-based solution, which it expects to deploy in BAM's digital network, subject to the availability of necessary network software and other equipment, by the end of 1999. This solution will enable BAM to provide digital service to any subscriber utilizing TTY digital equipment.

The significant investment that this network upgrade will require, however, will not alone be enough to achieve a full digital-TTY solution. In addition, handset and TTY device vendors must design, manufacture and test new wireless phones, and then distribute them for commercial sale, before BAM and other wireless carriers can make them available to subscribers. BAM has been unable to secure from any digital wireless phone vendor a commitment as to when it will make such equipment available for purchase and use by BAM's subscribers. While BAM is aware of the FCC's interest in establishing a final compliance date, given that this aspect of the solution is not under BAM's control, BAM cannot specify such a date.

BAM agrees that it is appropriate for it to supply quarterly progress updates to the FCC to demonstrate its continuing efforts to achieve a digital-TTY solution, and BAM commits to do so. In addition, should FCC Staff need additional information about BAM's efforts, BAM will immediately supply it. BAM also commits to direct its personnel to travel to Washington, D.C. to meet with the Staff upon request.

BAM had initially targeted a voice-based solution which relied on a direct audio connection via a 2.5 mm audio connector provided on some wireless phones, as described in the TTY Forum Workplan at 6-7. BAM found, however, that the 2.5 mm connection was not a standardized connector on all phones, and that the electrical values varied widely among phone manufacturers. BAM performed its own testing of this solution with both 2.5 mm audio connection as well as an RJ11

connection. Using the earliest test plans available from the TTY Forum, BAM found that most CDMA digital phones would not allow the transmission of TTY Baudot through the voice path of the phone. BAM then contacted phone suppliers and requested that they provide a modified test phone. This was to allow the Baudot signals to enter the phone's Vocoder without any signal processing such as noise suppression and/or echo cancellation. BAM's tests with the modified phones showed no improvement in performance with Baudot. These negative results were consistent with other testing which has been detailed in many previous reports by the TTY Forum.

BAM also contacted Lucent, its principal network supplier, met with Lucent, and requested that it test Baudot transmissions through BAM's network to isolate the problems. Lucent provided an initial report in May 1998 (see Attachment 2), and provided additional information and reports during the next several months, which were also provided to the TTY Forum. These reports documented the many unresolved problems with the direct audio connection voice-based solution for a CDMA wireless digital network. After considering the Lucent reports, its own testing, the data provided by the TTY Forum, and the time constraints imposed by the FCC, BAM decided that no voice-based solution would be readily achievable within an acceptable short term time frame.

BAM has thus decided to adopt and implement the Inter-Working Function (IWF) data-based solution. This solution, identified in the October 1998 TTY Forum Workplan, is a CDMA-based solution that will address TTY Baudot transmissions through a CDMA wireless phone and network. BAM is about to begin deployment of a CDMA data network. This network will have an added IWF that will be used for TTY calls. This IWF will be based on the V.18 modem protocol and the recommended System Requirement Documents issued by the TTY Forum in

October 1998. BAM's technical personnel have determined that this solution will enable it to provide the highest-quality service to hearing-impaired or speech-impaired subscribers who wish to use digital devices.

BAM provides digital service in nineteen states and the District of Columbia. The data network to support the IWF data-based solution must be deployed in stages, both because it must be tested as it is installed and because of personnel and budgetary constraints. Each switch must be fitted with the new software and other equipment, system interfaces must be deployed, and extensive other network efforts must be completed. BAM currently plans to deploy the network beginning in early 1999 and to complete it by the end of next year. BAM is working day-to-day with Lucent and other infrastructure vendors on this effort. In particular, it is working with 3Com, the vendor who will supply the specific IWF platform that will be designed to transmit digital TTY-originated calls. BAM has recently demanded that 3Com expedite its work on this necessary equipment. (See Attachment 3.)

One of the advantages of the IWF data-based solution is that it will respond to the "consumer concerns" that have been identified in the TTY Workplan. By adopting and implementing this data-based solution, BAM will also address these concerns. As the Workplan reports, further work needs to be done before it can be determined whether several of the consumer concerns will be fully addressed by this solution. BAM is committed to continuing its participation in efforts to ensure that as many of these concerns as possible are resolved by the IWF solution.

Completion of a digital solution also requires the manufacture of phones by equipment vendors. BAM has thus also sought commitments from all of its vendors and has continually met with them. To date, however, as set forth in the attached declaration of BAM's Staff Director for Subscriber Equipment, no phone vendor has

committed to BAM that it will supply phones by a date certain. (See Attachment 4.) BAM has demanded in repeated letters during 1998 that vendors supply such equipment. Examples of the most recent letters sent to all vendors are included (Attachment 5). BAM will continue to request that its vendors it make phones available.

Once phones are supplied, BAM will expedite the process for making new end-user equipment available to subscribers. This process requires coordination with direct distribution channels, agents and resellers throughout BAM's markets. BAM has developed a detailed plan for an expedited rollout of digital TTY handset equipment that shortens the usual distribution process to only five weeks. (See Attachment 6.) BAM is committed to make the new phones available to customers as immediately as possible after they are supplied by manufacturers.

BAM's present timeline for implementing digital TTY capability is thus contingent on the commercial availability of infrastructure equipment and software, as well as the availability of TTY-capable digital handsets. Subject to those contingencies, BAM's plans for the next six months are as follows:

December 1998 – February 1999:

-- Continue work with IWF vendor, 3Com, including discussions already in progress for TTY requirements and integration into CDMA data network infrastructure.

-- 3Com will submit research and development plans for nest generation software to be included in data-based TTY solution.

-- Continue work with all digital CDMA handset vendors, including review and followup on vendors' responses to BAM's demands that vendors expedite the testing, development and deployment of handsets.

-- Continue work with the industry CDMA Development Group (CDG) and the TTY Forum to provide supporting test data for solutions.

March 1999 – May 1999:

-- Continue all of above efforts.

-- Begin CDMA data network buildout in BAM's cellular service regions that will support data-based TTY solution.

-- Expect delivery from 3Com of next generation of software which address requirements for implementation of TTY solution.

-- Expect test products to be provided by handset vendors for studies of data-based solution.

ATTACHMENT 1:

BELL ATLANTIC MOBILE DISABILITY OUTREACH AND E911 TTY/DIGITAL NOTIFICATION STRATEGY

BELL ATLANTIC MOBILE DISABILITY OUTREACH

BAM currently sells equipment that will "fit" most TTY devices. **The wireless radiophones listed below can be used with most TTY devices:**

Motorola 3 Watt car phones and transportable phones:
Motorola SE (Special Edition)
Motorola Tote

Audiovox 3 Watt car phones and transportable phones:
Audiovox CTX 36600
Audiovox PRT 9100

Portable Phones:
Audiovox MVX855
Motorola Profile 300
Motorola DPC 650
Motorola Elite

Phones and attachments are available at all communications stores and the Orangeburg Fulfillment Center. BAM policy dictates that if a phone and the TTY attachment is unavailable when requested BAM will ship the merchandise next day air at no cost to the customer.

In addition, BAM makes available for purchase the **HAITS device** as an accessory product to those individuals that are profoundly deaf. The Hatis device is an accessory, which attaches to the back of the ear and plugs into any Bell Atlantic Mobile phone with a headset jack. 90% of all analog phones that Bell Atlantic Mobile sells are equipped with a headset jack. The HATIS device is available at the Orangeburg Fulfillment Center.

Customers can now obtain the following accurate and up to date information from BAM customer service department:
What BAM phones are compatible with a TTY device
How a TTY device works
800 numbers of all "relay operators" in the United States
Trouble shooting tips for those customers having difficulty connecting their TTY call
CTIA website address for more information concerning accessible service available to people with disabilities

BAM and CTIA have worked to develop common language (the E911 TTY/Digital Notification message) that is currently being used in all communication pieces. (see notification strategy).

BAM is currently working on a list of BAM product and services with fundamental characteristics that are easily accessible to people with disabilities. For, example talk dial may aid those individuals who are visually impaired.

E911 TTY/DIGITAL NOTIFICATION STRATEGY

Type of Customer	Methods of Notification	Delivery Date
Active Wireless Customers: • Individual accounts Resellers • National/corporate accounts	• Bill message • Information on internet site in Jan. 1999	• Has appeared on June 1998 bill cycle (to repeat quarterly) • TTY information will appear on the BAM internet site Jan. 1999
New Wireless Customers: **(Education- at point of sale- for people considering purchasing wireless services)** • Indirect & direct channels Individual Reseller	• Sales/customer care representatives • Product information in box (text in "Welcome to Bell Atlantic Mobile Guide") • Internet site (purchase on-line)	• June 1998/ongoing sent notification fact sheet to all regional customer care representatives • December 1998/ongoing product information in box (text in "Welcome to Bell Atlantic Mobile Guide") • Provide information on service and equipment for hard-of-hearing and TTY users on BAM internet site Jan. 1999
• BAM and CTIA worked to develop common language (the message) that is currently being used in all communication pieces related to this subject. Overall plan with deliverables and dates were communicated to CTIA in preparation for FCC quarterly reports.		

@Bell Atlantic Mobile

Marketing Operations

TTY- Overview

Date	6/5/98
Effective Date:	Immediately
Affected Markets:	ALL Regions
Distribution:	Customer Service, Communications Stores, Telemarketing
Background:	A TTY (also known as a TDD or Text Telephone) is a telecommunications device that allows people who are deaf, hard of hearing, or have speech or language disabilities to communicate by telephone. A TTY has a keyboard used to type information which then is transmitted as tones over a wired telephone line. The tones are translated to text that appears on a person's TTY screen. Federal law requires the telecommunications industry to provide a way for TTY's to communicate through wireless systems to make 911 calls. BAM is in compliance with this law and is offering a variety of cellular phones compatible with a TTY device.
Prepared By:	Nedra Lemons (908)306-6953
Contact:	Kim Hunter (908) 306-7359

BAM Cellular Phones Compatible With a TTY Device:

BAM currently sells equipment that will "fit" most TTY devices. Due to various sizes and structure compatibility of many make and models, **only the phones listed below can be used with a TTY device:**

Motorola 3 Watt car phones and transportable phones:
Motorola SE (Special Edition)
Motorola Tote

Audiovox 3 Watt car phones and transportable phones:
Audiovox CTX 3600
Audiovox PRT 9100

Portable Phones:
Audiovox MVX 855
Motorola Profile 300
Motorola DPC 650
Motorola Elite

(***Note: Digital phones currently are not compatible with a TTY device. This is due to the fact that digital phones do not recognize "tones", which is how the message is transferred through the system***).

RJ - 11 Attachment:

The RJ -11 attachment is **required with a portable phone** and is specific to the make/model of the phone. This attachment works similar to a landline phone jack, where the telephone cord connects from the jack to the back of the phone, to the TTY device.

Use the RJ-11 Adapter associated with the phones listed below:

Portable Phones:	RJ-11 Interface:
Audiovox MVX 855	Audiovox STI 80
Motorola Profile 300	Motorola S3027
Motorola DPC 650	Motorola S3027
Motorola Elite	Motorola S4229

TTY Device:

TTY Devices are available from several different companies; Ultratec Inc., Krown Mfg. Inc., Ameriphone Inc. etc. BAM does not provide TTY Devices.

TTY Device Continued

There are two ways to connect a TTY device to a phone:

Acoustic; place the handset of the phone onto the TTY acoustic cups (on top of TTY device).

RJ-11 wire; connect a wire directly from the TTY to the phone that provides an RJ-11 connection like your standard landline service.

The TTY device may have an **Acoustic** connection, an **RJ-11** connection or **Both**. The method of connecting the TTY to the phone service determines what Cellular Phone it will work with. The acoustic connection is compatible with the Motorola and Audiovox 3 watt car phones and transportable phones. The RJ-11 Adapter is compatible with the portable phones listed in this document.

Troubleshooting Tips:

The cellular telephone network is very different than the landline telephone network. If the customer is having trouble connecting, or is disconnected during the conversation, check the following items:

Difficulty connecting the call-

Make sure the cellular phone is an analog type phone.

Make sure the TTY device, RJ-11 interface, and cellular phone are turned on.

Make sure that each device has power (check batteries, if applicable)

The cellular phone seems to be dialing the telephone number, but it's not connecting -

Is the customer in their calling region ?

Did the cellular phone establish a signal before dialing the telephone number ?

After the conversation has begun, the TTY customer is disconnected with the other person, and receives garbled text.

Is the call being made while moving ? For example, is the customer riding a train, car, bus, etc.? If so, the customer may be losing their cellular connection due to tunnels, hills, or valleys. Try making the call again from a location where these items will not interfere with the cellular call.

Bill Message Sent To Customer:

911 and TTY Access Through Wireless Services
Federal law requires the telecommunications industry to provide a way for TTY's to communicate through **wireless systems** to make 911 calls. There are two types of wireless phones - analog and digital.

Analog Wireless Phones-It is possible today to use some analog phones to place wireless calls with some TTY's.

Digital Wireless Phones-It is not possible today to use a digital wireless phone reliably to call 911 with a TTY.

Research is being done to improve the ability of digital phones to work reliably with TTY's. The industry is working to resolve this matter by October 1998.

Some digital phones also can operate as an analog wireless phone. For more information or if you have questions concerning the capabilities of your wireless phone please contact our Customer Service Department 24 hours a day 7 days a week or visit the CTIA website at www.wow-com.com.

800 numbers To Provide To Customers:

Both parties (hearing customer and TTY customer) can still communicate with each other if only one has the TTY device. To do so, the hearing customer must use a "Relay Operator" to call a TTY customer, or receive a call from a TTY customer. A list of Relay and TTY phone numbers per state is included with this document.

If a customer wishes to purchase a TTY device, they can contact the manufacturer directly:

Krown Mfg:
817-738-2485 (voice)
817-738-8993 (TTY)

Ameriphone, Inc:
800-874-3005 (voice)
714-897-1111 (TTY)

Ultratec:
800-482-2424 (voice and TTY)

Relay Telephone Numbers

ADA Dept of Justice 800 514-0383 TTD 800 514-0301 VOICE
Hours: 10:00 AM - 6:00 PM, THURSDAY 1:00 PM - 6:00 PM

Federal Information Relay Service (hours 8am 8pm Eastern)
800-877-8339 TTY AND VOICE
For calling to or from a government employee's office. Recorded information line-
800-877-8845 TTY

AT&T National Customer Service - 800 682-8786 TTY 800 682-8706 VOICE
AT&T Relay Directory - 800 855-2880 TTY or 800 855-2881 VOICE TO TTY
AT&T Operator Service Directory TTY to TTY ONLY - 800 855-1155

MCI National Relay - 800 374-4833 TTY
MCI Relay Directory - 800 688-4889 TTY 800 947-8642 VOICE

Sprint National Relay: For any state-to-state, 800, 888 or international calls
800-877-8973 TTY AND VOICE
Sprint International Relay: For anyone outside the US to call into the US
1-605-224-1837

Sprint Relay Customer Service 24 hours a day for questions or concerns about Relay, or for TTY user's questions about their Sprint LD bills - 800-676-3777 TTY AND VOICE

Alabama	800-548-2546 TTY	800-548-2547 VOICE
Alaska	800-770-8973 TTY	800-770-8255 VOICE
Arizona	800-367-8939 TTY	800-842-4681 VOICE
Arkansas	800-285-1131 TTY	800-285-1121 VOICE
California	800-735-2929 TTY	800-735-2922 VOICE
Colorado	800-659-2656 TDD 800-659-4656 ASCI	800-669-3656 VOICE
Connecticut	800-842-9710 TTY	800-833-8134 VOICE
Delaware	800-232-5460 TTY	800-232-5470 VOICE
District of Columbia	202-855-1234 TTY	202-855-1000 VOICE
Florida	800-955-8771 TTY	800-955-8770 VOICE
Georgia	800-255-0056 TTY	800-255-0135 VOICE
Hawaii	808-643-8833 TTY	808-546-2565 VOICE In-state callers use the 4 digit 1-711 TTY, 1-511 VOICE
Idaho	800-377-3529 TTY	800-377-1363 VOICE
Illinois	800-526-0844 TTY	800-526-0857 VOICE
Indiana	800-743-3333 TTY AND VOICE	
Iowa	800-736-2942 TTY	800-735-2943 VOICE

Kansas	800-766-3777 TTY AND VOICE
Kentucky	800-648-6056 TTY 800-648-6057 VOICE
Louisiana	800-846-5277 TTY 800-947-5277 VOICE
Maine	800-437-1220 TTY 800-457-1220 VOICE 800 numbers for out of state callers In-state use the 207 numbers 207-955-3323 TTY 207-955-3777 VOICE
Maryland	800-735-2258 TTY AND VOICE
Massachusetts	800-439-2370 TTY AND VOICE
Michigan	800-649-3777 TTY AND VOICE
Minnesota	800-627-3529 TTY AND VOICE
Mississippi	800-582-2233 TTY AND VOICE
Missouri	800-735-2966 TTY 800-735-2466 VOICE
Montana	800-253-4091 TTY 800-253-4093 VOICE
Nebraska	800-833-7352 TTY 800-833-0920 VOICE
Nevada	800-326-6868 TTY 800-326-6888 VOICE
New Hampshire	800-735-2964 TTY AND VOICE
New Jersey	800-852-7899 TTY 800-852-7897 VOICE
New Mexico	800-659-8331 TTY 800-659-1779 VOICE
New York	800-662-1220 TTY 800-421-1220 VOICE
North Carolina	800-735-2962 TTY 800-735-8262 VOICE
North Dakota	800-366-6888 TTY 800-366-6889 VOICE
Ohio	800-750-0750 TTY AND VOICE
Oklahoma	800-722-0353 TTY 800-522-8506 VOICE
Oregon	800-735-2900 TTY 800-735-1232 VOICE 800-735-0644 ASCI 800-735-3896 SP
Pennsylvania	800-654-5984 TTY 800-654-5988 VOICE
Puerto Rico	800-240-2050 TTY 800-260-2050 VOICE 800-208-2828 TTY for long distance calls
Rhode Island	800-745-5555 TTY AND VOICE

South Carolina	800-735-2905 TTY AND VOICE	
South Dakota	800-877-1113 TTY AND VOICE	
Tennessee	800-848-0298 TTY	800-848-0299 VOICE
Texas	800-735-2989 TTY 800-735-2991 ASCI	800-735-2988 VOICE
Utah	801-298-9484 TTY Salt Lake City	
Vermont	800-253-0191 TTY	800-253-0195 VOICE
Virgin Islands	800-828-1120 TTY	
Washington (state)	800-833-6388 TTY 800-833-6385 TELEBRAILLE	800-833-6384 VOICE
West Virginia	800-982-8771 TTY	800-982-8772 VOICE
Wisconsin	800-947-3529 TTY AND VOICE	
Wyoming	800-877-9965 TTY	800-877-9975 VOICE

ATTACHMENT 2:

LUCENT REPORT ON DIGITAL TTY/TDD TESTING

MEETING AGENDA

E911 TTY / TDD

BELL ATLANTIC MOBILE

May 14, 1998: 9:00 AM
conference call see infoormation below

Review of April 21 Mtg	John DeFelice
CDMA Test Results	Ahmed Tarraf
Long Term Recommendations	Michael Recchione
Bell Atlantic Read-out From Mobile Vendors Meeting	Lee Whritenour / Rich Harvey
Next Steps.	All

Conference Duration: 02:00 Hours
Conference Size: 8 Port(s)
Bridge Telephone Number: 908-559-1049
Conference Code: 404682

TTY/TDD Testing

1.0 Introduction:

This document summarizes the results of TTY/TDD testing over CDMA 13k system as of 5/12/98.

2.0 Setup:

Figure 1 shows the test setup. Two NexCom 300vi modems were used to emulate two TTY terminals. An audio breakout box along with a telephone hybrid were used as an interface between QCP800 mobile and the TTY terminal. We were using cell load: 11.0 and 5E load: 5E12 with PHV2. Forward FER was measured at the mobile using mobile DM and reverse FER was measured at the base station using Cell DM.
The following text file was transmitted at one TTY terminal and was received at the other TTY terminal. It has 379 characters:

ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
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ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789

At the end of a transmission, the total characters received in error were counted and the error rate was calculated as:

Error rate = (total characters received in error /379)*100

3.0 Results

3.1 Simulation:

Simulation study was conducted using the 13k DSP vocoder software. The input to the simulator was TTY signal at nominal talking level (-19dbm0). This simulation produced 0% character error rate under 0% FER

3.2 System test:

The system test included mobile-to-land and land-to-mobile tests under 0% and 1% FER. System test results are shown in tables 1,2.

Table 1. Forward link

	Forward 0%	
Tx. No.	# characters in error	% character error
1	2	0.527704
2	2	0.527704
3	3	0.791557
4	3	0.791557
5	3	0.791557
6	4	1.055409
7	2	0.527704
8	1	0.263852
9	0	0
10	8	2.110818
Average	2.8	**0.738786**
St. Dev.	2.149935	**0.567265**

Table 2. Reverse link

	Reverse 0%	
Tx. No.	# characters in error	% character error
1	4	1.055409
2	12	3.166227
3	7	1.846966
4	3	0.791557
5	3	0.791557
6	2	0.527704
7	1	0.263852
8	3	0.791557
9	2	0.527704
10	1	0.263852
Average	3.8	**1.002639**
St. Dev.	3.359894	**0.886516**

Under 0% FER, land-to-mobile (forward) test produced 0.74% character error rate and mobile-to-land (reverse) test produced 1% character error rate. We think that error is due:

1- The level of the TTY signal going into the telephone line was two high (7 dB higher than the nominal talking level). We know form previous experience that 13k vocoder may produce some audio anomalies with tones (e.g. TTY signal) if the level of the tone is high. Unfortunately, we can not control the level of the TTY signal because it is coming directly for the TTY modem going into the telephone line.

2- The interface we have made up to link the mobile with the TTY modem might introduce some noise (due impedance mismatch and incorrect levels).

Any way, the level of character error rate (0.7%-1%) with 0% FER resulted from system test is similar to that level for AMPS (≈1%) under good RF condition. (Ericsson Report 1/22/98)

For 1% FER the test produced 7.4% character error rate. We think the error in that case is due to: (in addition to reasons 1 and 2 above):

3- Under higher FER, there are some signaling frames (B&B and D&B). These signaling frames are considered as frame errors.

4- A TTY character is represented by 8 bits (1 start bit, 5 data bits, and 2 stop bits), the length of each bit is 22 msec (2 msec longer than the length of CDMA frame). For AWGN channel (as we used in our tests), the errors are isolated (i.e., most likely do not occur in clusters). For 1 %FER, assume we transmit 300 characters (means 300*8*22/20=2640 CDMA frames), there will be 27 frames in error. A worst case scenario, is that these errors will be isolated in such way that each error will hit one bit of a character, means 27 characters will be in error. In that case the character error rate will be 9% (27/300). Based upon this theory, the relationship between character error (CER) rate and fame error rate (FER) is: CER=8.8*FER. Figure 2. shows that relationship.

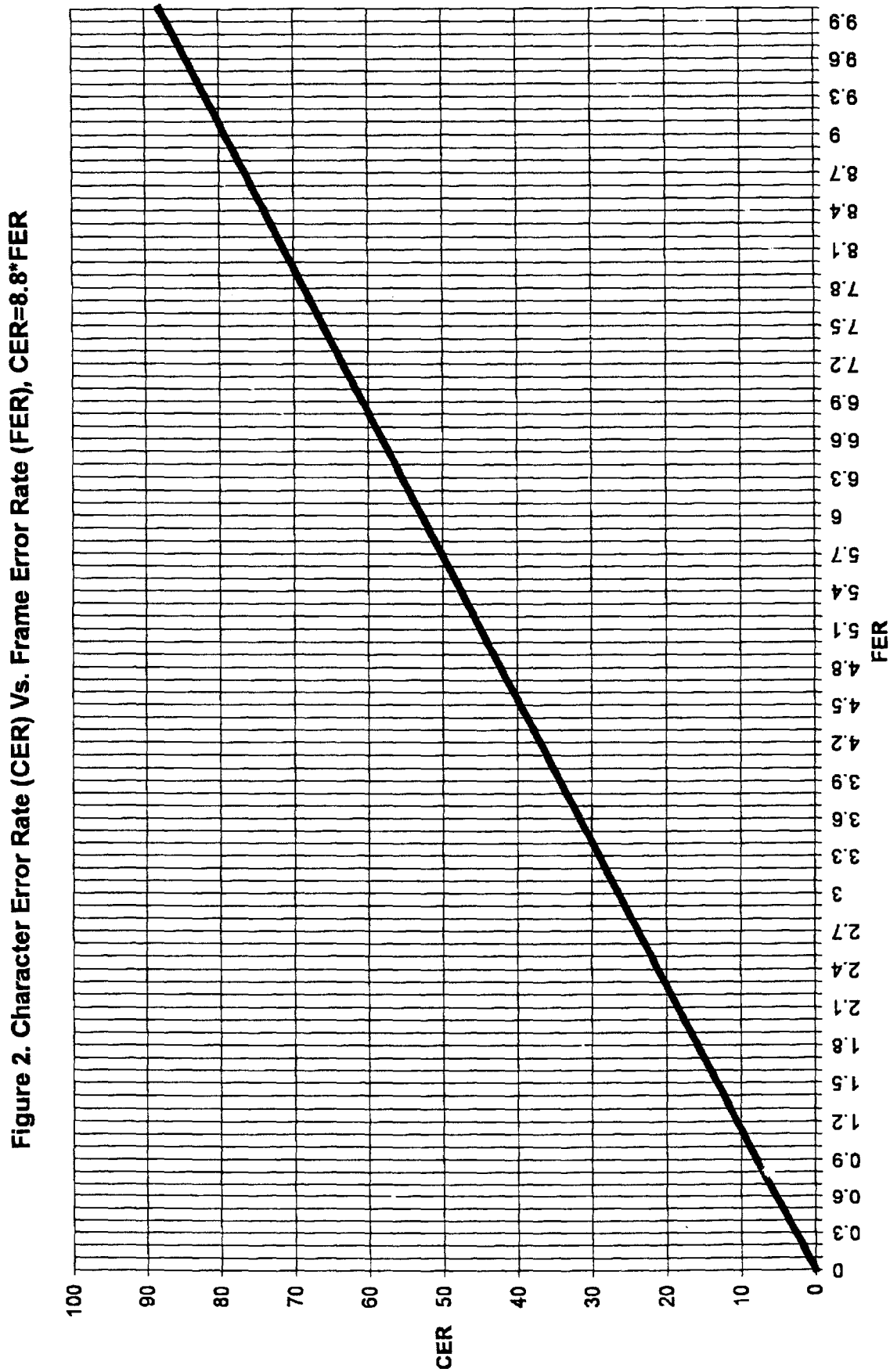

Figure 2. Character Error Rate (CER) Vs. Frame Error Rate (FER), CER=8.8*FER

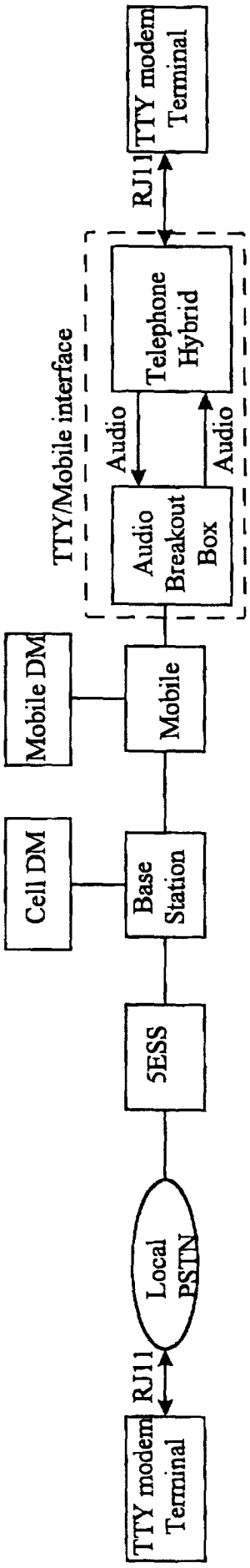

Figure 1. TTY/TDD test setup

TTY/TDD Testing

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This document summarizes the results of TTY/TDD testing over CDMA 13k system as of 5/12/98.

2.0 Setup:

Figure 1 shows the test setup. Two NexCom 300vi modems were used to emulate two TTY terminals. An audio breakout box along with a telephone hybrid were used as an interface between QCP800 mobile and the TTY terminal. We were using cell load: 11.0 and 5E load: 5E12 with PHV2. Forward FER was measured at the mobile using mobile DM and reverse FER was measured at the base station using Cell DM.
The following text file was transmitted at one TTY terminal and was received at the other TTY terminal. It has 379 characters:

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ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ 0123456789

At the end of a transmission, the total characters received in error were counted and the error rate was calculated as:

Error rate = (total characters received in error /379)*100

3.0 Results

3.1 Simulation:

Simulation using the 13k DSP vocoder software produced 0% character error rate under 0% FER

3.2 System test:

The system test included mobile-to-land and land-to-mobile tests under 0%, 1%, and 3% FER. System test results are shown in tables 1,2.

Table 1. Forward link

	Forward 0%		Forward 1%		Forward 3%	
Tx. No.	# characters in error	% character error	# characters in error	% character error	# characters in error	% character error
1	2	0.527704	24	6.332454	82	21.63588
2	2	0.527704	35	9.234828	66	17.41425
3	3	0.791557	24	6.332454	53	13.98417
4	3	0.791557	42	11.08179	72	18.99736
5	3	0.791557	15	3.957784	84	22.16359
6	4	1.055409	20	5.277045	75	19.78892
7	2	0.527704	39	10.29024	59	15.56728
8	1	0.263852	27	7.124011	60	15.83113
9	0	0	12	3.166227	83	21.89974
10	8	2.110818	42	11.08179	71	18.73351
Average	2.8	**0.738786**	28	**7.387863**	70.5	**18.60158**
St. Dev.	2.149935	**0.567265**	10.97472	**2.895704**	10.86534	**2.866844**

Table 2. Reverse link

	Reverse 0%	
Tx. No.	# characters in error	% character error
1	4	1.055409
2	12	3.166227
3	7	1.846966
4	3	0.791557
5	3	0.791557
6	2	0.527704
7	1	0.263852
8	3	0.791557
9	2	0.527704
10	1	0.263852
Average	3.8	**1.002639**
St. Dev.	3.359894	**0.886516**

Under 0% FER, land-to-mobile (forward) test produced 0.74% character error rate and mobile-to-land (reverse) test produced 1% character error rate. We think that error is due:

1- The level of the TTY signal going into the telephone line was two high (-8 dBu, it should be about -15 dBu). We know form previous experience that 13k vocoder may produce screech with tones (e.g. TTY signal) if the level of the tone is high. Unfortunately, we can not control the level of the TTY signal because it is coming directly for the TTY modem going into the telephone line.

2- The interface we have made up to link the mobile with the TTY modem might introduce some noise (due impedance mismatch and incorrect levels).

Any way, the level of character error rate (0.7%-1%) with 0% FER resulted from system test is similar to that level for AMPS (≈1%) under good RF condition. (Ericsson Report 1/22/98)

For 1% FER the test produced 7.4% character error rate and with 3% FER the test produced 18.8 % FER. We think the error in that case is due to: (in addition to reasons 1 and 2 above):

3- Under higher FER, there are some signaling frames (B&B and D&B). These signaling frames are considered as frame errors. In the case of 3% FER there was about 0.8% D&B.

4- A TTY character is represented by 8 bits (1 start bit, 5 data bits, and 2 stop bits), the length of each bit is 22 msec (2 msec longer than the length of CDMA frame). For AWGN channel (as we used in our tests), the errors are isolated (i.e., most likely do not occur in clusters). For 1 %FER, assume we transmit 300 characters (means 300*8*22/20=2640 CDMA frames), there will be 27 frames in error. A worst case scenario, is that these errors will be isolated in such way that each error will hit one bit of a character, means 27 characters will be in error. In that case the character error rate will be 9% (27/300). If this theory is correct, the upper limit under 1% FER will be 9% character error rate, and for 3% FER, the upper limit will be 26.4% character error rate!!!! Please Comment.

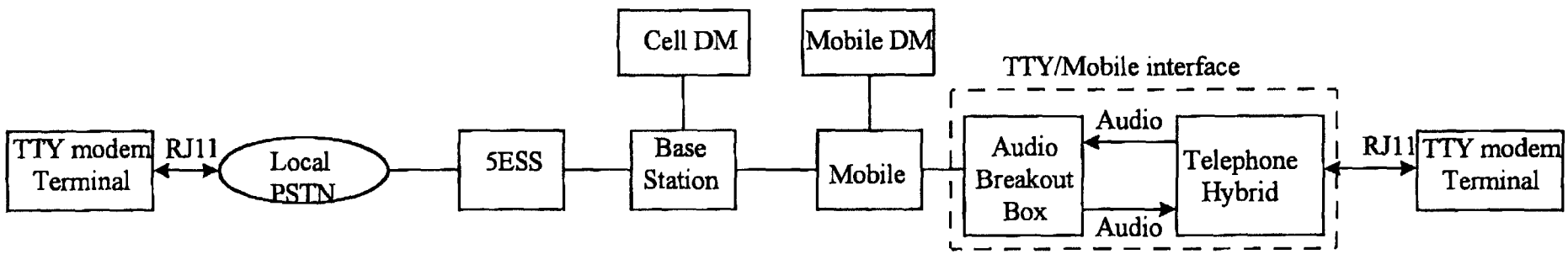

Figure 1. TTY/TDD test setup

ATTACHMENT 3:

SAMPLE LETTER TO 3COM (NETWORK IWF VENDOR)

Bell Atlantic Mobile
180 Washington Valley Road
Bedminster, NJ 07921
908 306-7413

Ted L. Hoffman
Vice President
Technology Development

November 24, 1998

Roger J. Manka
Vice President – Carrier Americas Sales
3Com Corporation
3800 Golf Road
Rolling Meadows, IL 60008

Dear Mr. Manka:

The Federal Communications Commission mandates that wireless licensees must be capable of transmitting 911 calls from individuals with speech or hearing disabilities through the use of TTY devices (using Baudot coding) over digital wireless systems, 47 C.F.R. § 20.18(c). Bell Atlantic Mobile must be in compliance with these TTY digital compatibility rules by December 31, 1998, after which possible fines for non-compliance will be imposed. In the event that equipment would not be commercially available by the FCC's December 31, 1998 compliance date, BAM will petition the FCC for the continued suspension of enforcement of Section 20.18(c).

Although the FCC has acknowledged that there are technical barriers and compatibility problems involved in implementing solutions for TTY users on digital wireless systems, we are demanding that you intensify your efforts to develop a technically feasible solution. BAM will continue to work cooperatively with you in producing viable digital ready products for TTY users. To this end we are requesting that you submit the following to BAM by December 14, 1998, outlining your plans to meet the industry goal to provide a commercially viable product by the December 31, 1998 deadline:

- A schedule of milestone dates of your lab tests. In the event you are unable to meet deadlines please show why and new timetables.
- Product development cycles with specific timetables.
- Workplan solutions that recommend future changes to improve TTY transmission over digital wireless systems.

If you recall, we outlined all open items needing to be resolved prior to entering into a General Purchase Agreement with Bell Atlantic Mobile in our letter, sent to you, November 2, 1998. Specifically, we requested that the 3com IWF Platform support TDD Service for TTY devices:

> "Ensuring that the IWF Platform can support TDD Service for TTY device for the hearing impaired. A copy of the System Requirements Document (May 20, 1998) for Circuit Switched Data, published by the TTY Forum, was faxed to you on 10-23-98"

Bell Atlantic Mobile is strongly committed to offering TTY compatible equipment to its digital wireless customers as close to the FCC's December 31, 1998 deadline as possible. Should you have any questions or need further assistance, please contact Lee Whritenour of my staff at (908) 306-6485. I look forward to your timely response to this request.

Sincerely,

Ted L. Hoffman

ATTACHMENT 4:

DECLARATION OF MARK J. KROLIAN

DECLARATION OF MARK J. KROLIAN

1. I am the Staff Director-Subscriber Equipment of Cellco Partnership ("Cellco"), which does business as Bell Atlantic Mobile ("BAM"). I have held this position since August 1998. From July 1995 through August 1998, I was a Product Manager at Cellco. Before working at Cellco, I was a Product Manager at NYNEX Mobile Communications ("NYNEX"). I have personal knowledge of the facts stated herein.

2. In my capacity as Staff Director, I am responsible for negotiating purchasing contracts with cellular telephone handset manufacturers. As a result I have been involved in BAM's efforts to come into full compliance with the Federal Communication Commission's (FCC) rules governing TTY access to 9-1-1 over digital wireless systems, 47 C.F.R, § 20.18(c).

3. On May 5, 1998 BAM hosted a presentation of approximately fifteen handset and infrastructure manufacturers to (1) educate them as to the FCC mandate of TTY digital compliance, (2) encourage manufactures to provide at a minimum of one digital phone in the standard product line for compliance on or before the October 1, 1998 deadline, and (3) steps BAM will take to notify current and potential consumers that TTY's are not compatible with digital wireless technologies. (attachment)

4. As of today, no manufacturer of wireless digital handsets have a product commercially available for BAM to purchase.

I hereby declare under penalty of perjury that the foregone is true and correct to the best of my knowledge and belief.

December 1, 1998

MARK J. KROLIAN

TTY/TDD Compatibility with Digital Wireless

to Meet E9-1-1 Compliance

FCC Mandate for E-9-1-1

- FCC E-9-1-1 Reconsideration order FCC 97-402
- Wireless carriers subject to TTY Compliance NOW!
  - Analog Systems effective December 1, 97
  - Digital Systems suspended until October 1, 98 (12 month extension from original date)

FCC Mandate for E-9-1-1 cont.

- Notification Requirement
  - Notify Current and Potential Consumers
    - Digital Phones **DO NOT** work with TTY today!
    - Recommended message produced by TTY Forum

      Message Expected to change as products become available
  - FCC Encourages Carriers to work with :
    - Infrastructure and Phone Manufactures
    - TTY User's and Public Safety Officials

How FCC Mandate affects BAM

- The Commission is "disappointed" with Wireless Industry and their progress to achieve compatibility
  - Industry had approx. three years to comply to original Oct. 1, 1997 deadline
  - Commission may grant 3 month extension from Oct. 1, 98 ONLY if progress towards compatibility is seen in quarterly reports
- BAM must meet October 1st compliance date
- BAM supports the ADA (American Disabilities Act)
- BAM supports/participates in the CTIA TTY/TDD Forum to resolve issues
- BAM must provide minimum of ONE phone in the standard product line for compliance on Oct. 1, 98
- Solutions found will support Section 255 of the Telecom Act
- Potential Customer Base of 28 Million Americans for Wireless

CTIA TTY/TDD Forum

- Collective of the stake holders in industry
  - Wireless infrastructure manufacturers
  - CPE manufacturers, Wireless and TTY/TDD
  - Wireless Carriers
  - User Communities
- Committed to identifying issues and involve subject matter experts to decide solutions for issues

What's a TTY Device

- Not a Computer with standard modem
- Uses a unique protocol called BAUDOT
  - Baudot consists of Frequency Shift Keying (FSK)
    - Uses 1400/1800 Hz tones @ 45.5 Baud Rate
  - Transmission is in Simplex
  - Uses Voice Path of phone for transmission
- TTY's are available in several forms
  - Home use with standard TTY or PC software w/TTY Modem
  - Portable compact TTY

TTY Compatibility Issues

- TTY's Connection to Phone
  - Traditional TTY User

    TTY device used in both directions of the conversation
    - Acoustic connection
    - RJ-11 connection
    - Future direct connect audio cable, in development?
  - VCO User (Voice Carry Over) & HCO User (Hearing Carry Over)

    TTY used in **ONE** direction only and Voice in other
    - Switchable Acoustic or Audio connection

TTY Compatibility Issues cont.

- How to Test TTY with Wireless
  - Tests developed at the CTIA TTY/TDD Forum
    - Currently using PC based TTY Modems with accepted test script
    - Future tests for field tests need development
- CDMA Vocoder compatibility
  - Are Vocoders capable of handling Baudot tones?
  - Which Vocoder is more of a problem?
    - Network, CPE, or certain manufacturer?
- CDMA Frame Erasure Rate (FER)
  - How will errors affect tones?
  - What level of FER is considered not acceptable?

TTY Compatibility Issues cont.

- What's Acceptable for ERRORS
  - What's acceptable for an emergency 9-1-1 call?
  - What errors are more critical than others?
- User acceptable functionality of Product
  - Connection of TTY to Phone
  - Functionality of SIGNALS to user
    - Ring/Alert- for Deaf, Vibrate or Flash Light?
    - Busy, Reorder, PIN Prompt, and other signals visual?
  - Cost of product and needed accessories
- Future requirements for E 9-1-1 Phase 2
  - call Back, re-ring (see FCC 96-264 Major Provisions of E911)

TTY testing

- Determine Baudot errors using accepted test from TTY Forum
- Baseline the Error rate for Baudot Tone transmission through CDMA
  - Baudot sent from Vocoder to Vocoder in LAB without RF and software interference
  - Baudot sent from TTY Equipment through phone with no noise cancellation in place.
  - TTY Equipment with commercial Phone using network

BAM'S Request for Assistance

- What's the Vendor's current status with TTY compatibility for October 1st?
- Can vendor baseline their Vocoder performance with TTY Baudot?
- Provide Test Product for BAM"S Testing
  - Modified phones without Noise canceling
  - Modified phones for connection to TTY
- What's Vendor's solution for TTY compatibility?

BAM"S Point of Contact

Please contact Lee Whritenour

908-306-6485

Internet E-Mail

LWHRITE1@MOBILE.BAM.COM

ATTACHMENT 5:

SAMPLE LETTERS TO WIRELESS PHONE VENDORS

Bell Atlantic Mobile
180 Washington Valley Road
Bedminster, NJ 07921
908 306-7413

Ted L. Hoffman
Vice President
Technology Development

November 24, 1998

Philip Christopher
President & CEO
Audiovox Communicaitons Corp.
555 Wireless Drive
Haupauge, NY 11788

Dear Mr. Christopher:

The Federal Communications Commission mandates that wireless CMRS licensees must be capable of transmitting 911 calls from individuals with speech or hearing disabilities through the use of TTY devices (using Baudot coding) over digital wireless systems, 47 C.F.R. § 20.18(c). Bell Atlantic Mobile must be in compliance with these TTY digital compatibility rules by December 31, 1998, after which possible fines for non-compliance will be imposed. In the event that equipment would not be commercially available by the FCC's December 31, 1998 compliance date, BAM will petition the FCC for the continued suspension of enforcement of Section 20.18(c).

Although the FCC has acknowledged that there are technical barriers and compatibility problems involved in implementing solutions for TTY users on digital wireless systems, we are demanding that you intensify your efforts to develop a technically feasible solution. Bell Atlantic Mobile will continue to work cooperatively with you in producing viable digital ready products for TTY users. To this end we are requesting that you submit the following to Bell Atlantic Mobile by December 14, 1998 outlining your plans to meet the industry goal to provide a commercially viable product by the December 31, 1998 deadline:

- A schedule of milestone dates of your lab tests. In the event you are unable to meet deadlines please show why and new timetables.
- Product development cycles with specific timetables.
- Workplan solutions that recommend future changes to improve TTY over wireless.

If you recall from our Bell Atlantic Mobile Vendor meeting on May 4 and our follow up letter sent to you on August 11, Bell Atlantic Mobile emphasized that TTY/TTD support is a requirement of our FCC license. As such, your company needs to place the highest priority on meeting these goals.

Bell Atlantic Mobile would like to encourage that you work with the CDMA Development Group (CDG) and also keep the CTIA informed of your progress and solutions so that the industry as a whole can benefit. Testing of your products by the consumers attending the CTIA/PCIA TTY Forum is imperative. Bell Atlantic Mobile will work diligently with you to meet the mandate and provide a product to customers as close to the FCC's deadline as possible. Thank you for your time and attention to this urgent matter. Should you have any questions please contact Lee Whritenour of my staff at (908) 306-6485. I look forward to your timely response to this request.

Sincerely,

Ted L. Hoffman

Bell Atlantic Mobile
180 Washington Valley Road
Bedminster, NJ 07921
908 306-7413

Ted L. Hoffman
Vice President
Technology Development

November 24, 1998

Paul Jacobs
President
Qualcomm Inc.
6455 Lusk Boulevard
San Diego, CA 94121

Dear Mr. Jacobs:

The Federal Communications Commission mandates that wireless CMRS licensees must be capable of transmitting 911 calls from individuals with speech or hearing disabilities through the use of TTY devices (using Baudot coding) over digital wireless systems, 47 C.F.R. § 20.18(c). Bell Atlantic Mobile must be in compliance with these TTY digital compatibility rules by December 31, 1998, after which possible fines for non-compliance will be imposed. In the event that equipment would not be commercially available by the FCC's December 31, 1998 compliance date, BAM will petition the FCC for the continued suspension of enforcement of Section 20.18(c).

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Sincerely,

Ted L. Hoffman

Bell Atlantic Mobile
180 Washington Valley Road
Bedminster, NJ 07921
908 306-7413

Ted L. Hoffman
Vice President
Technology Development

Bell Atlantic

November 24, 1998

Maureen Grzelakowski
Corporate Vice President & General Manager
Cellular Systems Group
Motorola Inc.
1501 W. Shure Drive
Arlington Heights, IL 60004

Dear Ms. Grzelakowski:

As you know, as a vendor of wireless infrastructure systems to Bell Atlantic Mobile, Motorola must work with Bell Atlantic Mobile to meet certain government mandates. This is particularly the case where the mandate requires that equipment manufactured by your firm support certain capabilities. The Federal Communications Commission has mandated that all wireless carriers be able to transmit TTY/TDD signals to 911 centers. This includes all calls placed on both analog and CDMA digital systems.

Federal law mandates that CMRS licensees must be capable of transmitting 911 calls from individuals with speech or hearing disabilities through the use of TTYs (using Baudot coding) over digital wireless systems, 47 C.F.R. § 20.18(c). Bell Atlantic Mobile must be in compliance with TTY digital compatibility by December 31, 1998, after which possible fines for non-compliance will be imposed. In the event that equipment would not be commercially available by the FCC's December 31, 1998 compliance date, Bell Atlantic Mobile will petition the FCC for the continued suspension of enforcement of Section 20.18(c).

Although the FCC has acknowledged that there are technical barriers and compatibility problems involved in implementing solutions for TTY users on digital wireless systems, we are demanding that you intensify your efforts in achieving a technically feasible solution. Bell Atlantic Mobile will continue to work cooperatively with you in producing viable digital results for TTY users. To this end we are requesting that you submit to Bell Atlantic Mobile by December 14, 1998:

- A schedule of milestone dates of your lab tests in meeting the industry goal to provide a commercially viable product by the December 31 deadline. In the event you are unable to meet deadlines please show why and new timetables.
- Product development cycles with specific timetables.
- Workplan solutions that recommend future changes to improve TTY over wireless.

Unlike many other projects undertaken by our companies, TTY/TDD support is a requirement of our FCC license. As such, our companies need to place the highest priority on meeting these goals. If you have any questions or need additional information, please contact Lee Whritenour of my staff at (908) 306-6485. I look forward to your timely response to this request.

Sincerely,

Ted L. Hoffman

ATTACHMENT 6:

TTY-COMPATIBLE DIGITAL PHONE PRODUCT INTRODUCTION

Product Introductions
5 Week Cycle

WEEK I.

- Manufacturer presents new product to PM
- PM reviews checklist of issues to establish "go/no go decision.
    * Contract Volume YTD
    * Pricing
    * Competitive Issues
    * Regional Promotion opportunities
    * Accessory Compatibility
    * CTIA Approval
    * Feature/Functionality
    * Availability: Quantity , Timing
    * Positioning within existing line-up

WEEK II.

- PM tests 2 production units with: cables, manual, programming, any available accessories etc.
- PM and QA review and prioritize product testing list.
- Product is evaluated by the Engineering and Network groups and final results are reviewed with PM.
- PM tests phones from a consumer perspective.
    * Keypad
        - view in sunlight and dark.
        - tactile feedback of keys
        - ease of operation of volume , Send, and End keys
    * Display
        - view in sunlight and dark.
    * Antenna
        - ease of operation
        - flexibility
    * Battery
        - adequate fit in phone housing
        - accurate talk time, standby, and charging times
    * Accessories
        - adequate interface with phone
        - accurate specifications
    * User Manual
        - verify content and accuracy.
        - confirm accuracy of specified unit weight.

WEEK III.

- PM informs Metrics and Analysis to add product to forecast list.
- PM provides 1 unit and copy to MS for literature development.
- PM provides information to Retail Channel Marketing (RCM) for callout card development.
- PM recommends Planogram positioning.
- PM approves logo size and placement on the phone.
- PM requests UPC label on outer box.
- PM communicates anticipated launch date to regions.

WEEK III(parallel activities).

- Provide Introduction Package to all Regions & RCM (via E-Mail and hardcopy with all attachments: Inventory codes, literature codes, suggested retail, accessory codes, user manual, programming instructions, feature benefits)
- QA provides introduction to technical field contacts.
- Communicate launch in the monthly inventory meeting
- Update Bulletin Board with correct pricing and configuration.
- MS delivers literature and callout card drafts.
- Manufacturer approves all merchandising copy.
- PM updates training group on new product.
- Feature Matrix is updated.

WEEK IV.

- QA gives approval/disapproval.
- Regions supply 90 day forecast quantities.
- Order initial stocking quantities of phones, parts, and accessories to CTDI.
- 2 random units and available accessories pulled from inventory to be tested prior to release to the field (to be turned around in 48 hours).

WEEK V.

- Package introduced to the field with projected ship dates.
- Deplete existing stock (if unit is a replacement)